	Application No.	Applicant(s)
Notice of Allowability	10/683,853	PERCIVAL, JAMES I.
	Examiner	Art Unit
	Mehdi Namazi	2189

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *4/18/2005*.

2. ☒ The allowed claim(s) is/are *1-4, 7-17, and 19-30 which has been renumbered as 1-27*.

3. ☒ The drawings filed on *10 October 2003* are accepted by the Examiner.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some*   c)☐ None of the:

      1. ☐ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

    * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

    (a)☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____ .

    (b)☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of

    Paper No./Mail Date _____ .

    Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)

3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date *4/18/05, 7/18/05*

4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material

5. ☐ Notice of Informal Patent Application (PTO-152)

6. ☒ Interview Summary (PTO-413), Paper No./Mail Date *8/16/05* .

7. ☒ Examiner's Amendment/Comment

8. ☒ Examiner's Statement of Reasons for Allowance

9. ☐ Other _____ .

DETAILED ACTION

1.   This office action is in response to amendment filed April 18, 2005.

Terminal Disclaimer

2.   *The terminal disclaimer filed on 8/17/2005 disclaiming the terminal portion of any*

patent granted on this application, which would extend beyond the expiration date of

application No. 10/709,040, and any patent granted on application number has been

reviewed and is accepted. The terminal disclaimer has been recorded.

EXAMINER'S AMENDMENT

3.   An examiner's amendment to the record appears below. Should the changes

and/or additions be unacceptable to applicant, an amendment may be filed as provided

by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be

submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview

with Robert M. Asher (Reg. No. 30,445) on August 16, 2005.

The application has been amended as follows:

1.   (currently amended) A method for accelerating access to data on a network

comprising:

        providing a plurality of computers on the network, each with cache software;

        receiving in one of the computers, from an application, a write instruction that

specifically addresses data in a cached I/O device connected to the network;

maintaining exclusive write access control over the specifically addressed data in

the cached I/O device;

writing data into cache in the one of the computers responsive to the write

instruction;

communicating invalidate messages over the network with the cache software at

all only those computers that permit caching with respect to the cached I/O device to

invalidate data in remote caches on the network that cache the cached I/O device;

sending a write I/O completion signal to the application after completing the

invalidation of the specifically addressed data in the remote caches on the network.

2.   (original) The method of claim 1 wherein the specifically addressed data is a

single data block.

3.   (original) The method of claim 1 further comprising releasing the exclusive write

access control after completing the invalidation of the specifically addressed data in the

remote caches on the network.

4.   (currently amended) A method for coherently caching a shared I/O device

available on a network comprising:

providing a plurality of computers on the network each with cache software; and

creating a data structure that provides a list of the computers on the network that

permit caching with respect to the shared I/O device; and

after data is written to the shared I/O device, communicating invalidate messages

to only the with each computers in the list of computers to invalidate data in remote

caches corresponding to the shared I/O device.

5.   (canceled)

6.   (canceled)

7.   (currently amended) A method for accelerating access to data on a network

comprising:

       providing a plurality of computers on the network, each with cache software for

creating caches with a plurality of cache data bucket sizes;

       receiving, in one of the computers, a write instruction having data to be written

into addresses on one of said I/O devices;

       selecting one of a the plurality of cache data bucket sizes available in the one of

the computers;

       writing the data into a data bucket of the selected data bucket size responsive to

the write instruction; and

       communicating over the network with remote caches to invalidate cache data

corresponding to any of the addresses.

8.   (original) The method of claim 7 wherein a byte count of the data written

responsive to the write instruction determines the cache data bucket size selected.

9.   (currently amended) A method for coherently caching an I/O device available for

shared access on a network comprising:

       providing a plurality of computers on the network, each with cache software; and

       privately communicating targeted invalidate messages on a computer

communication channel between cache software on a first of the computers caching the

I/O device and cache software on a second of the computers caching the I/O device.

10.   (original) The method of claim 9 further comprising intercepting, in the cache software of the first of the computers, a write instruction to the I/O device.

11.   (currently amended) The method of claim 10 wherein privately communicating comprises sending a <u>targeted</u> message through the computer communication channel from the cache software of the first of the computers to the cache software of the second of the computers to invalidate data responsive to the write instruction.

12.   (currently amended) The method of claim 11 further comprising privately communicating on computer communication channels with <u>only those</u> ~~all of the~~ computers caching the I/O device to invalidate data responsive to the write instruction.

13.   (currently amended) A method for coherently caching I/O devices available for shared access on a network comprising:

        providing a plurality of computers on the network, each with cache software, the cache software for storing data into any of a plurality of caches each being of a different data bucket size;
receiving a write instruction having data to be written into addresses in one of the I/O devices;

        writing data into one of the caches <u>with a suitable bucket size for the data</u> responsive to the write instruction; and

        communicating over the network to invalidate cache data corresponding to addresses that overlap with addresses for the data in the write instruction.

14.   (currently amended) A method for coherently caching I/O devices available for shared access on a network comprising:

providing a network with a plurality of nodes, each with a cache ~~driver~~ software

that implements a cache;

creating a cache for one of the I/O devices at one of the nodes not currently

caching said one of the I/O devices; and

communicating with ~~all the~~ cache ~~drivers~~ software at all the nodes on the network

that permit caching with respect to said one of the I/O devices to inform them that said

one of the I/O devices may be cached on said one of the nodes so that invalidate

messages are properly targeted.

15.   (currently amended) A method for coherently caching I/O devices available for

shared access on a network comprising:

providing a network with a plurality of nodes, each with a cache

~~driver~~ software; and

registering each cached I/O device with all the cache ~~drivers~~ software on all

nodes that permit caching said cached I/O device so that the cache software knows to

which nodes to send invalidation messages.

16.   (original) The method of claim 15 further comprising forming communication

channels with each of the nodes in said plurality of nodes.

17.   (currently amended) A method for coherently caching I/O devices available for

shared access on a network, comprising:

providing a network with a plurality of nodes, each with a cache ~~driver~~ software

that implements a cache; ~~and~~

creating, at each node that may cache one of the I/O devices, a data structure for

the one of the I/O devices that includes a list of all nodes on said network that permit

caching with respect to the one of the I/O devices;

receiving an instruction to write data to a shared cached disk I/O device in one of

the nodes;

writing said data into the cache in the one of the nodes that received the write

instruction;

causing the writing of cached data to be written to the shared cached I/O device;

receiving back the write completion signal from the shared cached I/O device,

after the data has been written to it; and

communicating invalidate messages over the network only to those remote

nodes listed in the list in the cache software for the shared cached I/O device to

invalidate the data block(s) in the caches corresponding to any address just written to in

the shared cached I/O device.

18.   (canceled)

19.   (currently amended) The method of claim ~~18~~ 17 wherein the data written to the

shared cached I/O device and invalidated on the remote nodes in the list is a single data

block.

20.   (currently amended) The method of claim ~~18~~17 further comprising:

disabling cache operations upon finding that a new node joined the

network; and

enabling caching operations at each node after each node has connections in

place with the cache ~~driver~~ software of every other node on the network.

21.   (currently amended) The method of claim ~~18~~17 further comprising listening on

the network for a request from a new node to join the network.

22.   (currently amended) The method of claim ~~18~~17 wherein said communicating

over the network occurs after said receiving back the write completion signal.

23.   (previously presented) A method for accelerating access to data on a network

comprising:

providing a plurality of computers on the network, each with cache software;

causing the writing of cached data block(s) to be written to a shared cached I/O

device;

receiving back a write completion signal from the shared cached I/O device, after

the data has been written to it; and

communicating over the network to invalidate the data block(s), corresponding to

the data just written to the shared cached I/O device, in the remote caches on the

network listed in a list for the shared cached I/O device provided by the cache software,

said list corresponding to the caches on the remote nodes that permit caching with

respect to the shared cached I/O device.

24.   (previously presented) The method of claim 23 wherein the data written to

shared cached I/O device and invalidated at the remote nodes in the list is a single data

block.

25.   (previously presented) The method of claim 23 further comprising:

disabling cache operations upon finding that a new computer joined the network;

and

enabling caching operations at each computer after each computer has

connections in place with the cache software of every other computer on the network.

26.   (previously presented) The method of claim 23 further comprising listening on

the network for a request from a new computer to join the network.

27.   (previously presented) The method of claim 23 wherein said communicating

over the network occurs after said receiving back the write completion signal.

28.   (previously presented) The method of claim 4 further comprising:

disabling caching operations upon finding that a new computer has joined the

network; and

enabling caching operations at each computer after each computer has

connections in place with the cache software of every other computer in the network.

29.   (previously presented) The method of claim 28 further comprising listening on the

network for a request from a new computer to join the network.

30.   (previously presented) The method of claim 7 further comprising receiving back

a write completion signal from the one of said I/O devices and wherein communicating

over the network occurs after said receiving back.

Reason for Allowance

4.   The following is an examiner's statement of reasons for allowance: as per claims

1, 4, 9, 14, 15, 17, 23 the prior art of the record fails to teach providing communication

messages over the network between only those computers that permit caching with respect to the cache I/O devices.

As per claims 7, 13, the prior art of the record fails to teach cache software for creating caches with plurality of a plurality of cache data bucket sizes.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

5.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mehdi Namazi whose telephone number is 571-272-4209. The examiner can normally be reached on Monday-Friday 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mano Padmanabhan can be reached on 571-272-4210. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

Mehdi Namazi
Art Unit 2189

**MANO PADMANABHAN
SUPERVISORY PATENT EXAMINER**